IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Venkat Selvamanickam		
Title:	HIGH-THROUGHPUT EX-SITU METHOD FOR RARE-EARTH-BARIUM-COPPER-OXIDE (REBCO) FILM GROWTH		
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Commissioner for Patents
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BRIEF ON APPEAL

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This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(1)):

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The final page of this brief before the beginning of the Appendix of Claims bears the representative's signature.

I. REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

Assignment from the inventor to the sole assignee, SuperPower, Inc., of 450 Duane Avenue, Schenectady, NY 12304, was recorded by the United States Patent and Trademark Office (USPTO) on April 29, 2004, at Reel/Frame:014579/0932. The real party of interest is SuperPower, Inc.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c)(1)(ii))

Appellant, Appellant's legal representatives, and Assignee know of no related appeals or interferences which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS (37 C.F.R. § 41.37(c)(1)(iii))

Claims 1-5 and 7-19 all of which are rejected and remain pending herein. Claim 6 is canceled. Each of claims 1-5 and 7-19 is hereby appealed by Appellant.

IV. STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

No amendment was filed or entered after the Final Office Action.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

A concise explanation of the subject matter defined in each of the independent claims involved in the appeal is provided below.

A. Claim 1

Claim 1 is reproduced below for clarity.

1. A process for producing long lengths of a layered superconductor comprising:
coating a buffered metal substrate tape with metalorganic precursors of $REBa_2Cu_3O_7$ where RE is a rare earth to form a coated tape, wherein coating is carried out during the process of metalorganic deposition (MOD);

translating the coated tape through a precursor conversion zone in a process chamber at a rate of at least about 10 meters per hour;

introducing oxygen and water vapor through a showerhead into the precursor conversion zone while translating the coated tape;

heating the coated tape to a temperature in the range between about 700°C. to about 850°C. within the precursor conversion zone; and

reacting the water vapor, oxygen, and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the coated tape through the precursor conversion zone,

where the pressure in the process chamber is in the range between about 1 Torr to about 760 Torr and where the substrate resides in the precursor conversion zone for a period of time sufficient to convert the precursors to a superconducting coating epitaxial to the buffer layer.

The claimed process for producing long lengths of a layered superconductor comprises coating a buffered metal substrate tape with metalorganic precursors of $REBa_2Cu_3O_7$ where RE is a rare earth to form a coated tape (page 8, lines 14-17 of the Present Application). The coating is carried out during the process of metalorganic deposition (page 8, lines 14-17 of the Present Application). The process further includes translating the coated tape through a precursor conversion zone in a process chamber at a rate of at least about 10 meters per hour (page 12, lines 11-15 and page 13, line 20 through page 14, line 1 of the Present Application), and introducing oxygen and water vapor through a showerhead into the precursor conversion zone while translating the coated tape (page 10, lines 6-10 of the Present Application). Additionally, the process include heating the coated tape to a temperature in the range between about 700°C. to about 850°C. within the precursor conversion zone (page 12, lines 15-18 of the Present Application) and reacting the water vapor, oxygen, and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the coated tape through the precursor conversion zone (page 13, lines 2-5 of the Present Application). The pressure in the process chamber is in the range between about 1 Torr to about 760 Torr (page 8, line 20 through page 9, line 3 of the Present Application). The substrate resides in the precursor conversion zone

for a period of time sufficient to convert the precursors to a superconducting coating epitaxial to the buffer layer (page 13, lines 2-5 and 11-13 of the Present Application).

A. Claim 12

Claim 12 is reproduced below for clarity.

12. A process for producing long lengths of a layered superconductor comprising:

coating a buffered metal substrate tape with metalorganic precursors of $REBa_2Cu_3O_7$ where RE is a rare earth to form a coated tape, wherein coating is carried out during the process of metalorganic deposition (MOD);

translating the coated tape through a precursor conversion zone in a process chamber at a rate of at least about 10 meters per hour;

introducing oxygen and water vapor through a showerhead into the precursor conversion zone while translating the coated tape, the showerhead having a width at least as wide as the sum of the widths of the translating coated tapes plus the sum of the distances between each of the translating coated tapes and having a length at least as great as the width;

heating the coated tape to a temperature in the range between about 700°C. to about 850°C. within the precursor conversion zone; and

reacting the water vapor, oxygen, and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the tape through the precursor conversion zone,

where the pressure in the process chamber is in the range between about 1 Torr to about 760 Torr and where the substrate resides in the precursor conversion zone for a period of time sufficient to convert the precursors to a superconducting coating epitaxial to the buffer layer.

The claimed process for producing long lengths of a layered superconductor comprises coating a buffered metal substrate tape with metalorganic precursors to form a coated tape. The metalorganic precursors are precursors of $REBa_2Cu_3O_7$ where RE is a rare earth (page 8, lines 14-17 of the Present Application). The coating is carried out during the process of metalorganic deposition (page 8, lines 14-17 of the Present Application). The process further includes

translating the coated tape through a precursor conversion zone in a process chamber (page 12, lines 11-15 of the Present Application), and introducing oxygen and water vapor through a showerhead into the precursor conversion zone while translating the coated tape (page 10, lines 6-10 of the Present Application). The translating is at a rate of at least about 10 meters per hour (page 13, line 20 through page 14, line 1 of the Present Application). The showerhead has a width at least as wide as the sum of the widths of the translating coated tapes plus the sum of the distances between each of the translating coated tapes and has a length at least as great as the width (page 9, lines 12-18 and FIG. 9 of the Present Application). The process further includes heating the coated tape to a temperature in the range between about 700ºC. to about 850ºC. within the precursor conversion zone (page 12, lines 15-18 of the Present Application) and reacting the water vapor, oxygen, and the metalorganic precursors to form a superconducting coating while translating the tape through the precursor conversion zone (page 13, lines 2-5 of the Present Application). The pressure in the process chamber is in the range between about 1 Torr to about 760 Torr (page 8, line 20 through page 9, line 3 of the Present Application) and the substrate resides in the precursor conversion zone for a period of time sufficient to convert the precursors to a superconducting coating epitaxial to the buffer layer (page 13, lines 2-5 and 11-13 of the Present Application).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. § 41.37(c)(1)(vi))

A. Appellant respectfully requests review of the rejection of claims 1-5, 8-13, and 15-18 under 35 U.S.C 103(a) over US Pat. 6,794,339 (hereinafter "Weismann") in combination with either US Pat. 4,962,085 (hereinafter "deBarbadillo") or US Pat. 5,206,216 (hereinafter "Yoshida") further in combination with US Pat. 5,653,806 (hereinafter "Van Buskirk") further in combination with US Pub. 2005/0014653 (hereinafter "Reeves").

B. Appellant respectfully requests review of the rejection of claim 7 under 35 U.S.C. § 103(a) over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with

Reeves further in combination with US Pat. 6,774,088 (hereinafter "Manabe") or US Pat. 6,083,885 (hereinafter "Weinstein").

C. Appellant respectfully requests review of the rejection of claim 14 under 35 USC 103(a) over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves further in combination with US Pat 5,279,138 (hereinafter "Ott").

VII. ARGUMENTS (37 C.F.R. § 41.37(c)(1)(vii))

A. Claims 1-5, 8-13, and 15-18 would not have been obvious under 35 U.S.C. § 103(a) over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves.

The USPTO has the burden of establishing a *prima facie* case of obviousness. *See generally*, MPEP §§ 2142 and 2143. In particular, to establish a *prima facie* case of obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). Additionally, the USPTO must articulate "(1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) a finding that there was reasonable expectation of success; and (3) whatever additional findings based on the *Graham* factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness." If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art. MPEP §2143. There must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l v. Teleflex Inc.*, 550 U.S. 398, 418, 82 USPQ2d 1385, 1395 (2007). Appellant particularly notes that the combination as set forth by the USPTO must have a reasonable expectation of success as viewed by one of ordinary skill in the art. MPEP §2143.02. As will be discussed in more detail below, the USPTO has failed to provide a proper teaching,

suggestion, or motivation to combine Weismann, deBarbadillo, Yoshida, Van Buskirk, and Reeves to teach all the claim limitations. Further, the USPTO has failed to show that one of ordinary skill in the art would have expected a reasonable likelihood of success and that the expectation of success must be found in the prior art, not in the Present Application. Therefore, the USPTO has failed to establish a *prima facie* case of obviousness.

1. Claims 1-5, 8-13, and 15-18 are allowable over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves.

Claim 1 is directed to a process for producing long lengths of layered superconductor. The coated tape is translated through a conversion zone while oxygen and water vapor are introduced through a showerhead. The claimed invention particularly calls for reacting the water vapor, oxygen, and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the coated tape through the precursor conversion zone (i) at a rate of at least about 10 meters per hours, and (ii) for a period of time sufficient to convert the precursor to a superconductor coating. Achieving a throughput of at least about 10 meters per hour for an *ex-situ* process is significant in this regard.

There are a number of techniques for forming a superconducting coating on a substrate. These techniques can be classified as *ex-situ* processes and *in-situ* processes. In an *in-situ* process, such as pulsed laser deposition (PLD), sputtering, and metalorganic vapor deposition (MOCVD), growth of the superconducting coating occurs in a single step. *In-situ* processes do not involve reacting water vapor and precursors that have been coated on a substrate. *In-situ* processes are will suited for high-throughput applications as *in-situ* processes can deposit a superconducting film at a rate of up to 1-5 microns per minute. *See,* page 3 lines 1-7 and page 4 line 16 through page 5 line 6 of the Present Application.

The chemical reactions that form a superconducting coating using *ex-situ* processes are different from the *in-situ* processes. In an *ex-situ* process, such as metalorganic deposition (MOD), spray pyrolysis, and BaF_2 post annealing, precursors are deposited atop a substrate and subsequently undergo <u>a separate chemical reaction that converts the precursors to a superconducting coating</u> (page 3 lines 8-14 of the Present Application). The conversion reaction for the *ex-situ* process occurs on the order of 1 Angstrom per second, which is about <u>three orders of magnitude slower</u> than an *in-situ* process. Utilizing different precursor chemicals alters the chemical reaction for conversion to a superconductor material in this inherently unpredictable art. In a particular MOD process, trifluoroacetic acid complexes of rare-earth, barium, and copper are mixed in a solvent and applied to the substrate, such as by dipcoating. In order to form the superconductor layer, the organics are baked off and the precursor material is reacted with water vapor to form a superconducting layer.

In the claimed process, the reaction of the water vapor, oxygen, and metalorganic precursors can involve removal of the organic carrier molecules and combining the RE, Ba, and Cu with oxygen in the required stoichiometry to form the superconductor coating. Achieving a quality superconductor coating along the length of the coated tape while translating the coated tape through the precursor conversion zone has particular challenges. To produce a quality HTS film, it is necessary for the precursors to be exposed to the conversion zone for <u>sufficient time</u> to convert the precursor film to the HTS film. Increasing the translation rate <u>reduces the amount of time</u> the precursors are exposed to the conversion zone and, without compensation, can lead to incomplete conversion of the film. Additionally, changes in the oxygen or water vapor partial pressures within the precursor conversion zone can affect the reaction rate. In a batch process where the entire coated substrate is placed in the conversion zone while the reaction is carrier out to completion, this effect can be experienced equally throughout the substrate. However, in a continuous process where the coated tape is translated through the conversion zone, these types of changes can lead to undesirable variability in the quality of the superconductor coating along the length of the coated tape. Furthermore, the current carrying capacity of the entire tape is limited by the tape segment having the

lowest current carrying capacity. Thus, a short term fluctuation temporarily reducing the reaction rate could have disastrous effects in a continuous process, but may not significantly effect the overall quality in a batch process.

Turning to the references addressed in the Office Action, the USPTO relies upon Weismann to teach particular portions of claim 1. Weismann discloses an *ex-situ* process including forming a precursor film and heat treating the precursor film at sub-atmospheric pressures in the presence of oxygen and water vapor (Weismann in Abstract). Specifically, Weismann utilizes the BaF_2 post anneal process in which a precursor film consisting of BaF_2, Y, and Cu is deposited onto a substrate using vapor deposition (Weismann at col. 4, line 59 through col. 5 line 4). The coated substrate is placed in a conversion chamber for the duration of the conversion process. During the heat treatment step, the metal containing layer is oxidized in the presence of water vapor and oxygen to form the superconducting layer. The superconducting film grows at a rate of from about 1 to about 20 Angstroms per second (Weismann at col. 4, lines 20-22). At page 3 of the Office Action, the USPTO acknowledges Weismann fails to teach a process utilizing coated tapes. Additionally, Weismann fails to teach a process including reacting the water vapor and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the tape through the precursor conversion zone, let alone at a rate of at least about 10 meters per hour. Further, Weismann fails to recognize the particular challenges associated with an *ex-situ* process involving a translating the coated tape through the precursor conversion zone.

The USPTO relies on DeBarbadillo or Yoshida to allegedly suggest modifying the *ex-situ* process of Weismann to include translating a coated tape though a conversion zone. DeBarbadillo discloses a metal superconductor precursor layered on a metal substrate (DeBarbadillo at col. 4, lines 18-31). The metal substrate can include tapes, ribbons, and wire. (DeBarbadillo at Abstract, Fig. 1, and col. 1, lines 1-15). DeBarbadillo teaches an oxidation process of metal precursors, rather than utilizing metalorganic precursors. As previously discussed, the conversion of metalorganic precursors in an *ex-situ* reaction requires removal of the organic carrier molecules

through evaporation and burnout. These organic carrier molecules may be involved in side reactions, such as with the oxygen present in the precursor conversion zone, effecting the desired reaction for forming the superconductor coating. As such, DeBarbadillo, alone or in combination with Weismann, fails to recognize the challenges associated with *ex-situ* conversion of metalorganic precursors while translating a coated substrate through the conversion zone.

Yoshida discloses an *in-situ* pulsed laser deposition (PLD) method for depositing a superconducting film on a metal tape (Yoshida in Abstract). Significantly, Yoshida teaches that PLD is particularly suited for fabrication of long lengths of tape and can achieve a throughput of about 5 cm/min to 50 cm/min (3 to 30 meters/hour) due to the high deposition rate of PLD (Yoshida at col. 2, lines 60-69). The thickness of the superconducting coating, and thus the current carrying capacity, is dependant on the throughput and the rate at which the superconductor coating is formed. Due to the significant differences in the rate of formation of the superconductor coating between the processes of Weismann and Yoshida, one of ordinary skill in the art would not have had an expectation of success by applying the process parameters, specifically the throughput, of Yoshida to the process of Weismann. Accordingly, the USPTO has not provided a proper motivation to combine the throughput of Yoshida with the process of Weismann. Even so, Yoshida in combination with Weismann, fails to teach an *ex-situ* conversion of metalorganic precursors while translating a coated substrate through the conversion zone.

Further, the USPTO acknowledges that Weismann in combination with DeBarbadillo or Yoshida fail to teach the use of a showerhead to supply oxygen and water vapor. As such, the USPTO relies on Van Buskirk for disclosure of a showerhead for delivery of gases and vapors to a substrate.

The USPTO apparently relies upon Reeves to allegedly suggest modifying the teachings of Weismann, DeBarbadillo or Yoshida, and Van Buskirk to include translating at a rate of at least about 10 meters per hour. Reeves discloses an *in-situ* method including translating a tape through a deposition chamber at a rate of between 0.3 meters/hr and 10 meters/hr (Reeves at paragraph [0063]). Reeves discloses forming the

superconductor layer using *in-situ* processes such as PLD and CVD. Similar to Yoshida, due to the significant differences in the rate of formation of the superconductor coating between *in-situ* and *ex-site* processes, one of ordinary skill in the art would not have an expectation of success from combining the translation rate of Reeves with the *ex-situ* process of Weismann. Accordingly, the USPTO has not provided a proper motivation to combine the translation rate of Reeves with the process of Weismann.

At least some degree of predictability is required to support a finding of obviousness. *See generally*, MPEP §§ 2143.02. *In-situ* and *ex-situ* processes involve inherently different chemical processes, and the chemical reaction of the water vapor with the precursors to form the superconducting coating is inherently unpredictable. The USPTO suggests that it would be obvious to utilize a translation rate of at least 10 meter per hour based on the teachings of Reeves (*in-situ* process). However, one of ordinary skill in the art would have recognized that *in-situ* processes and *ex-situ* processes form superconducting films at significantly different rates using significantly different chemistries. Yoshida and Reese clearly suggest that *in-situ* processes with high deposition rates are better suited for fabrication of superconducting wire at high speeds, such as in a method including translating at a rate of at least about 10 meters per hour. Even so, while Reeves suggests it would be desirable to achieve a translation rate of at least 10 meters/hr, Reeves, alone or in combination with the cited references, fails to teach or suggest how to achieve *ex-situ* conversion of metalorganic precursors while translating a coated substrate through the conversion zone (i) at a rate of at least 10 meters/hr, and (ii) for a period of time sufficient to convert the precursor to a superconductor coating. The USPTO has failed to show that one of ordinary skill in the art would have expected to obtain a functional product when accelerating the translation rate during an *ex-situ* process. Indeed, based on the conversion rates and absent Applicant's own disclosure, one of ordinary skill in the art would have expected an incomplete conversion and a nonfunctional product when applying the translation rate of an *in-situ* process, such as the one in Reeves, to an *ex-situ* process, such as the one in Weismann or deBarbadillo. Additionally, the chemical reaction required for conversion is inherently unpredictable, and the *ex-situ* processes of Weismann and deBarbadillo

utilize different chemical reactions to form HTS material from the claimed MOD process. Therefore, the references fail to provide an expectation of success when reacting water vapor, oxygen, and metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the tape through the precursor conversion zone (i) at a rate of at least about 10 meters per hours, and (ii) for a period of time sufficient to convert the precursor to a superconductor coating. In absence of Applicant's disclosure, one of ordinary skill in the art, would have not have expected an *in-situ* process, such as PLD or CVD, to predict translating at a rate of at least about 10 meters per hour using an *ex-situ* MOD process.

Appellant submits that Weismann, deBarbadillo, Yoshida, Van Buskirk, and Reeves, individually or in combination, fail to teach or suggest an *ex-situ* conversion of metalorganic precursors while translating a coated substrate through the conversion zone (i) at a rate of at least about 10 meters per hours, and (ii) for a period of time sufficient to convert the precursor to a superconductor coating. Therefore, the USPTO has failed to establish a *prima facie* case of obviousness with respect to claim 1 because the USPTO has failed to provide a reasonable expectation of success as viewed by one of ordinary skill in the art. MPEP §2143.02. Appellant respectfully submits that claim 1 is allowable. Claims 2-5, 8-11, 13, and 15-17 depend directly or indirectly from claim 1 and are allowable for at least the same reasons as claim 1. Therefore, Appellant respectfully requests the Board to reverse the rejection of claims 1-5, 8-11, 13, and 15-17.

2. Claims 12 and 18 are allowable over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves.

The USPTO has the burden of establishing a *prima facie* case of obviousness, which requires the prior art references must teach each and every claim limitation. See generally, MPEP §§ 2142 and 2143. In particular, to establish a *prima facie* case of obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka,* 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974).

As discussed above with regard to claim 1, Weismann, deBarbadillo, Yoshida, Van Buskirk and Reeves, individually or in combination, fail to teach, suggest, or motivate one of ordinary skill in the art to achieve the claimed method including translating a coated tape through a conversion zone (i) at a rate of at least about 10 meters per hours, and (ii) for a period of time sufficient to convert the precursor to a superconductor coating. On this basis alone, the obviousness rejection of claim 12 should be reversed.

Furthre, the USPTO has failed to prove that all the claim limitations in claim 12 can be found in the combination of Weismann, deBarbadillo, Yoshida, Van Buskirk, and Reeves. Therefore, the USPTO has failed to establish a *prima facie* case of obviousness.

Claim 12 is directed to a method of producing long lengths of layered superconductors. Claim 12 includes coating a buffered metal substrate tape with superconductor precursors during the process of metalorganic deposition. Claim 12 further requires translating the coated tape through a conversion zone at a rate of at least about 10 meters per hour and introducing oxygen and water vapor are into the conversion zone through a showerhead while translating the coated tape to convert the precursors into a superconducting coating. The showerhead has (i) a width at least as wide as the sum of the widths of the translating coated tapes plus the sum of the distances between each of the translating coated tapes and (ii) a length at least as great as the width.

The USPTO has relied upon Van Buskirk to apparently teach the use of a showerhead for delivery of gases to a substrate. Van Buskirk discloses a circular showerhead for depositing metal organic precursors and oxygen to a circular wafer rather than a translating tape. The USPTO has provided no motivation, absent Appellant's own disclosure, to modify the showerhead of Van Buskirk to have (i) a width at least as wide as the sum of the widths of the translating coated tapes plus the sum of the distances between each of the translating coated tapes and (ii) a length at least as great as the width.

Appellant respectfully submits that the USPTO has not provided a proper factual finding that Weismann, deBarbadillo, Yoshia, Van Buskirk, and Reeves, individually or

in combination, teach, suggest, or provide motivation to achieve the claimed method including introducing oxygen and water vapor through a showerhead having (i) a width at least as wide as the sum of the widths of the translating coated tapes plus the sum of the distances between each of the translating coated tapes and (ii) a length at least as great as the width. As such, the USPTO has failed to establish a *prima facie* case of obviousness with respect to claim 12 because not all claim limitations are found in the references. Appellant respectfully submits that claim 12 is allowable over Weismann, deBarbadillo, Yoshia, Van Buskirk, and Reeves. Further, claim 18 depends from claim 12 and is allowable for at least the same reasons as claim 12. Therefore, Appellant respectfully requests the Board to reverse the rejection of claims 12 and 18.

3. Claim 13 is allowable over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves.

In addition to the reasons explained with respect to claim 1, claim 13 is allowable over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves for at least another reason. Claim 13 includes a further limitation that reaction by-products are removed from the process chamber by a pumping system <u>located proximate to the precursor conversion zone</u>. Appellant discovered locating the pumping system proximate to the precursor conversion zone enabled better handling of the high gas loads. Additionally, the combination of the showerhead to inject oxygen and water vapor and the use of a pumping system close to the conversion zone enables a uniform flow pattern necessary for uniform film growth over large areas, page 11, line 10 through page 12, line 2 of the Present Application.

While Weismann discloses a pumping system to remove by-products, Weismann describes a vaccum processing apparatus where the exhaust port is located at the opposite end of a quartz tube from the gas inlet (Weismann at FIGs. 2 and 3 and col. 7, line 62 through col. 8, line 11). Similarly, Van Buskirk discloses an apparatus where the pump is located near one end of the deposition chamber (Van Buskirk at FIGs. 1-4, 6, and 8). Appellant discovered that conventional furnaces, similar to that described by Weismann

and Van Buskirk, were inadequate for handling the large gas loads and attaining uniform distribution. Further, deBarbadillo, Yoshida, and Reeves are silent on the location of a pumping system. Absent Appellant's own disclosure, the USPTO provides no motivation to locate the pumping system proximate to the precursor conversion zone.

Appellant respectfully submits that the USPTO has not provided a proper factual finding that Weismann, deBarbadillo, Yoshia, Van Buskirk, and Reeves, individually or in combination, would have taught, suggested, or provided motivation to achieve the claimed method including translating a coated tape through a precursor conversion zone in a processing chamber wherein reaction by-products are removed from the process chamber by a pumping system located proximate to the precursor conversion zone. As such, the USPTO has failed to establish a *prima facie* case of obviousness with respect to claim 13 because not all claim limitations are found in the references. Appellant respectfully submits that claim 13 is allowable over Weismann, deBarbadillo, Yoshida, Van Buskirk, and Reeves. Therefore, Appellant respectfully requests the Board to reverse the rejection of claim 13.

B. Claim 7 would not have been obvious under 35 U.S.C. § 103(a) over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves further in combination with Manabe or Weinstein.

Claim 7 depends directly from claim 1 and is allowable for at least the same reasons as claim 1. Therefore, Appellant respectfully requests the Board to reverse the rejection of claim 7.

C. Claim 14 would not have been obvious under 35 U.S.C. § 103(a) over Weismann in combination with either deBarbadillo or Yoshida further in combination with Van Buskirk further in combination with Reeves further in combination with Ott.

Claim 14 depends directly from claim 1 and is allowable for at least the same reasons as claim 1. Therefore, Appellant respectfully requests the Board to reverse the rejection of claim 14.

VIII. CONCLUSION

For at least the foregoing reasons, Appellant respectfully requests the board to review and reverse the grounds for rejection subject to appeal.

Respectfully submitted,

June 7, 2010 /David A. Schell/

Date

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IX. APPENDIX 1: CLAIMS INVOLVED IN THE APPEAL (37 C.F.R. § 41.37(c)(1)(viii))

The text of each claim involved in the appeal is as follows:

1. A process for producing long lengths of a layered superconductor comprising:

coating a buffered metal substrate tape with metalorganic precursors of $REBa_2Cu_3O_7$ where RE is a rare earth to form a coated tape, wherein coating is carried out during the process of metalorganic deposition (MOD);

translating the coated tape through a precursor conversion zone in a process chamber at a rate of at least about 10 meters per hour;

introducing oxygen and water vapor through a showerhead into the precursor conversion zone while translating the coated tape;

heating the coated tape to a temperature in the range between about 700°C. to about 850°C. within the precursor conversion zone; and

reacting the water vapor, oxygen, and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the coated tape through the precursor conversion zone,

where the pressure in the process chamber is in the range between about 1 Torr to about 760 Torr and where the substrate resides in the precursor conversion zone for a period of time sufficient to convert the precursors to a superconducting coating epitaxial to the buffer layer.

2. The process of claim 1 where the substrate is selected from the group consisting of stainless steel and nickel alloys.

3. The process of claim 1 where the substrate is biaxially textured.

4. The process of claim 1 where the buffer on the metal substrate tape is selected from the group consisting of YSZ, CeO_2, MgO, $SrTiO_3$, $LaMnO_3$, $SrRuO_3$, Y_2O_3, Gd_2O_3, $LaSrMnO_3$ and combinations thereof.

5. The process of claim 1 where the pressure in the process chamber is in the range between about 10 Torr to about 760 Torr.

7. The process of claim 1 where the atmosphere in the process chamber has a dew point between about 40°C. to about 80°C.

8. The process of claim 1 where a partial pressure of water vapor in the process chamber is between about 1 Torr and about 50 Torr.

9. The process claim 1 where the oxygen is introduced through the showerhead with a carrier gas, an oxygen content in the carrier gas ranging between about 10 ppm and 10%.

10. The process of claim 1 where a partial pressure of the oxygen and water vapor is substantially consistent throughout the precursor conversion zone.

11. The process of claim 1 where the distribution of the oxygen and water vapor is uniform throughout the precursor conversion and film growth zone.

12. A process for producing long lengths of a layered superconductor comprising:

coating a buffered metal substrate tape with metalorganic precursors of $REBa_2Cu_3O_7$ where RE is a rare earth to form a coated tape, wherein coating is carried out during the process of metalorganic deposition (MOD);

translating the coated tape through a precursor conversion zone in a process chamber at a rate of at least about 10 meters per hour;

introducing oxygen and water vapor through a showerhead into the precursor conversion zone while translating the coated tape, the showerhead having a width at least as wide as the sum of the widths of the translating coated tapes plus the sum of the distances between each of the translating coated tapes and having a length at least as great as the width;

heating the coated tape to a temperature in the range between about 700°C. to about 850°C. within the precursor conversion zone; and

reacting the water vapor, oxygen, and the metalorganic precursors of $REBa_2Cu_3O_7$ to form a superconducting coating while translating the tape through the precursor conversion zone,

where the pressure in the process chamber is in the range between about 1 Torr to about 760 Torr and where the substrate resides in the precursor conversion zone for a period of time sufficient to convert the precursors to a superconducting coating epitaxial to the buffer layer.

13. The process of claim 1 wherein reaction by-products are removed from the process chamber by a pumping system located proximate to the precursor conversion zone.

14. The process of claim 1 wherein the process chamber is a cold-wall chamber.

15. The process of claim 1, wherein the showerhead has a plurality of fine openings through which the oxygen and water vapor pass.

16. The process of claim 15, wherein the fine openings are evenly spaced.

17. The process of claim 1, wherein translating occurs at a rate between 10 and 400 meters per hour.

18. The process of claim 12, wherein translating occurs at a rate between 10 and 400 meters per hour.

19. The process of claim 1, wherein MOD includes applying a solution of organic complexes of rare-earth, barium, and copper to the buffered substrate tape and heating the coated tape to remove the organic compounds.

X. EVIDENCE APPENDIX (37 C.F.R. § 41.37(c)(1)(ix))

No evidence was submitted by Appellant pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132.

XI. RELATED PROCEEDINGS APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

Appellant, Appellant's legal representatives, and Assignee are aware of no decisions that have been rendered by a court or the Board.